

Problem 2.2.5: Communication Breakdown

Introduction

You have explored electrical communication from the basic flow of ions in the membrane to the communication of nerve cells via chemical signals called neurotransmitters. Unfortunately, at many points along the communication pathway, this system can fail. And when this system fails, the effects are disastrous. Since the brain controls all aspects of our day-to-day functioning, a misfire in one area of the brain can have far-reaching consequences.

In this activity, patients are coming to you, a neurologist, for help. You will work to analyze patient symptoms, determine the areas of the brain that are affected, research the possible causes of the symptoms and provide a diagnosis to your patient. You must gather evidence to support your diagnosis and to describe how this disorder is linked to an error in electrical communication. You will present your findings to a panel of your colleagues and you will use models from previous activities to show your peers how this error is occurring. To further explore careers in biomedical science, you will also recommend professionals who may help your patients deal with the day-to-day trials of their disease and better their quality of life.

Equipment

* Computer with Internet access and presentation software
* Brain map (on foam head)
* Neuron models
* Anatomy in Clay® Maniken®
* Career journal
* Laboratory journal

Procedure

1. You are a neurologist, a scientist trained to diagnose and treat disorders of the brain. Your group of neurologists will be assigned one of the 9 neurological diseases described below to educate your patients about these particular diseases.
   1. Alzheimers Disease
   2. Meningitis
   3. Parkinson’s Disease
   4. Stroke
   5. Huntington’s Disease
   6. Multiple Sclerosis
   7. Epilepsy
   8. ALS
   9. Stroke
   10. Familial Hemiplegic migraine

With your group, prepare a 7-10 slide computer presentation that provides information about your neurological disease.

Slide 1: Background, what is the disease and cause of the disease

Slide 2: Symptoms

Slide 3: Diagnosis (how is this disease diagnosed)

Slide 4: How this disease is linked to an error in communication? How did this lead to the disease. This is the very important slide, you are taking slide one and going into depth about the cause and communication errors that occur.

Slide 5: Prognosis of a patient with this disease

Slide 6: Treatment of the disease

Slide 7: Give two biomedical professionals that may be able to help an individual deal with his/her disease. Think about what life will be like for a patient with this disease. What other physicians, researchers, caregivers or therapy providers may be able to help treat, cure or improve life for this patient.

1. Create a slide and use visuals to show how this disease is linked to an error in communication. Use your neuron model, your brain model, your action potential or synapse diagrams, or your brain cap to show how this error occurs and can lead to the symptoms of the disease. Additional MRI images of the brain can also be found at The Whole Brain Atlas available from: <http://www.med.harvard.edu/AANLIB/home.html>. Modify your model system to demonstrate how a change in the system is linked to the disease and to the symptoms the patient is experiencing. You can use more than one model if you feel you need more visuals to show the extent of the communication error.
2. Lastly, research two biomedical professionals that may be able to help this individual deal with his/her disease. Think about what life will be like for your patient. What other physicians, researchers, caregivers or therapy providers may be able to help treat, cure or improve life for your patient?
3. Add a slide for each professional that describes his/her job and explains how this individual can help improve the quality of life of your patient.

**Part 2:** Read the appropriate case profile and then complete the steps to diagnose your patient based on the information presented by your classmates. When you think your team has them all correct, come up and check with me.

* **Patient #1**- Sarah, a 28-year-old woman, has noticed strange “pins and needles” feelings in her feet and hands. She has been very tired lately and she says that when she goes to the gym “she just feels weak.” She says that her inability to exercise has been making her feel depressed. Her vision seems to be getting worse and she’s made an appointment with her ophthalmologist for later in the week. Most recently, she has experienced moments of unsteadiness when she walks. She was a gymnast in high school; she has never had a problem with balance before. She has noticed that her symptoms seem to come and go. She experiences periods of fatigue and balance problems, but the majority of the time she feels just fine.
* **Patient #2**- A 78-year-old man comes to your office with his daughter. The daughter reports that her father, David, has been confusing the name of relatives and is having trouble controlling his emotions. Her father was once a respected mathematician, but he is now having trouble completing simple calculations. He even claims that he does not know how to play the card game they have been playing since she was a little girl. She tried to get him to shower and put on clean clothes for the doctor’s visit, but he is adamant about the fact that he is clean. Most recently, he has had trouble recognizing people he has known for years. For quite some time, he has had trouble finding items such as his glasses or keys and his daughter attributed this to the natural aging process. Now she is not so sure.
* **Patient #3**- A woman brings her 10-year-old son, Jonathan, in to see you. He’s been overly aggressive and angry lately, but she has attributed this to her divorce from Tim’s father. Last night, Tim attended a party at his friend’s house. After a night of laser tag and little sleep, Jonathan started shaking and convulsing. He stopped before his mom arrived, but she still wanted to get him checked out. Jonathan does not really remember falling to the floor, but he does remember that he smelled a very unpleasant odor right before he went down.
* **Patient #4**- Rudy, 55 years old, comes in to your office with his wife, Rita. She is concerned because she has seen some changes in her husband. She reports that at some points he seems to be moving in slow motion. Getting dressed and ready to leave the house in the morning seems to take longer every day. She has also noticed that he often loses his balance and when he thinks she is not looking, he often keeps a hand on the wall for support. Rudy keeps relatively quiet and when asked, claims nothing is wrong, but as he passes you his paperwork, you notice that his hand is shaking. You look down at the paper and notice that his handwriting is so tiny that it’s almost illegible.
* **Patient #5**- Timothy, a 45 year-old single father of two, comes to you in confidence. He’s noticed that the muscles in his hands and feet have gotten progressively weaker lately, and from time to time, he sees these muscles twitch. He used to lift weights at the gym quite a bit, but he now has trouble lifting the bar. His daughter noticed that he seems to be tripping and stumbling quite often and commented that it took him quite a long time to get the key in the door the other day. Timothy claims that mentally he feels fine, but it’s almost like his muscles are slowly giving out on him. You don’t see any twitches going on right now, but you are having a hard time hearing him. He seems to be having trouble projecting his voice and his speech is slightly slurred at times.
* **Patient #6**- Martha, a 35 year-old teacher, has been referred to you from a psychologist who works in your building. She was being treated for depression and mild mood swings, but now that she has started having physical symptoms, the psychologist thinks she needs a neurology consult. Obviously nervous, Martha says, “You might think I am crazy, but sometimes my hands and feet just seem to move on their own, kind of like they are dancing.” She goes on to say that she remembers her mother experiencing the same thing a few weeks before she died. Sadly, her mother was killed in a car crash before the doctors could ever explore her symptoms. Other than the limb movement, Martha has noticed that she seems to be forgetting little details at work. She has a few bruises on her legs. When asked about them, she tells you that she has been a bit clumsy lately and seems to fall down more than she used to.
* **Patient #7**: Jamie Anderson, a 28 year old was brought to the emergency room by her husband. Mr. Anderson explained that his wife was having another episode in which she experienced pronounced weakness/paralysis of one side of her body (leg, arm, and face) together with sensory symtoms (numbness/tingling on the same side of the body) and or visual symptoms (blurriness/ loss of vision on one side.) CT scans and MRIs of her brain came back normal. Review of her family history found that her mother and maternal grandmother had similar symptoms particularly as teenagers and young adults but symptoms disappeared by menopause.
* **Patient 8**: Case # 8 Barry a 21 year old student at Cal State East Bay studying Computer science came in with his mother. He exhibited a high fever of 104 that started yesterday and had a terrible headache and stiff neck. He seemed a little confused and his mother said she couldn’t get him to eat or drink anything. There was a rash on his chest.

1. Use information from your classmate’s presentations to diagnose your patient. You may want to explore information about nervous system disorders and see if symptoms listed match up with what you see in your patient.
2. When you believe you have enough evidence to back up your diagnosis for each patient, present your findings to your teacher. When the teacher accepts your diagnosis,
3. Answer the Conclusion questions.

Conclusion

1. The disease you investigated involved a problem in the nervous system. Explain how other body systems were affected by this error.
2. Brainstorm and describe at least two types of medical interventions that may help your patient.
3. Explain why even when their bodies seem to be failing, people with ALS have all of their mental functions and senses intact.